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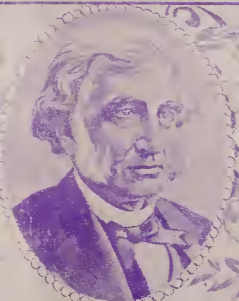
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FEBRUARY, 1898.

No. 6.

THE AGRICULTURAL STUDENT



J.S. MORRILL



N.S. TOWNSEND.

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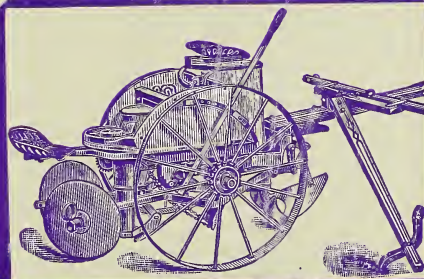
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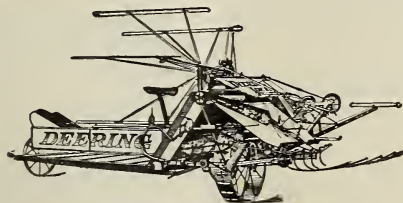
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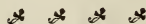
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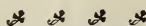
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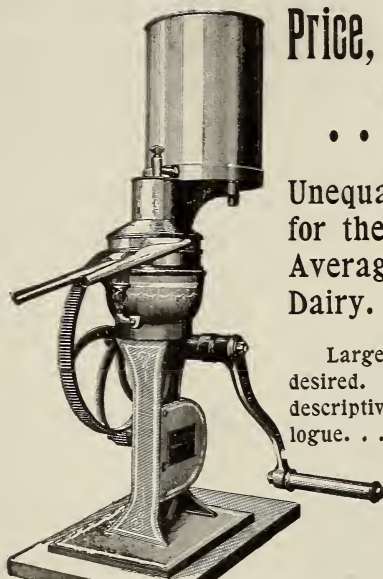
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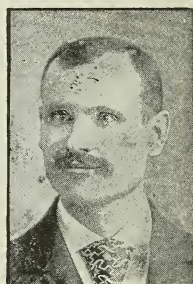
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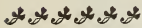
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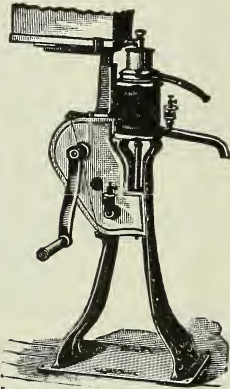
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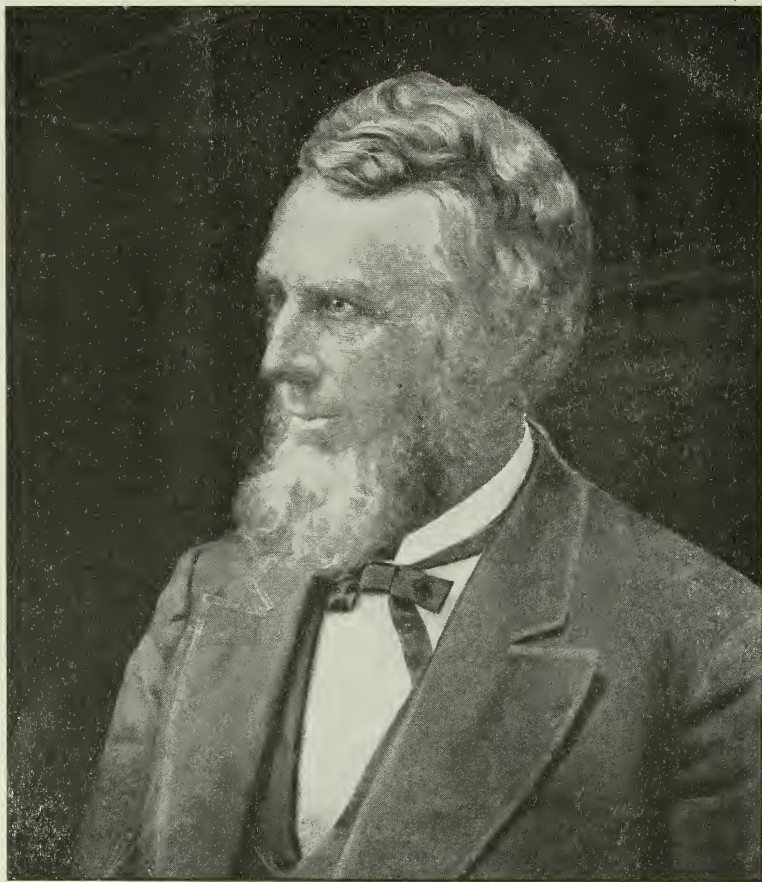
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NORTON S. TOWNSHEND, M. D.

BORN: CLAY COATON, ENGLAND, 1815.
DIED: COLUMBUS, OHIO, 1895.

THE AGRICULTURAL STUDENT.

VOL. IV. OHIO STATE UNIVERSITY, COLUMBUS, FEBRUARY, 1898. No. 6.

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TOWNSHEND MEMORIAL NUMBER.

This issue of the Agricultural Student is the Townshend Memorial number. The entire issue is devoted to the exercises at the dedication of Townshend Memorial Hall, on January 12, 1898. The addresses here reproduced are the same that were delivered upon that day. The addresses of two of the speakers were not in manuscript and consequently we are unable to present them here. We refer to the addresses of Col. J. H. Brigham, Assistant Secretary, U. S. Department of Agriculture, and Hon. S. H. Ellis, Master of the State Grange.

Those who were fortunate enough to be present at the dedication exercises, had the pleasure of hearing from the lips of his yoke-fellows the story of Dr. Townshend's life. And what a life it was! Firm of purpose, clear in his aims, he kept straight to his course and was swerved by nothing. Large-hearted and kind, much of his energy was given to helping the oppressed and lifting up the fallen. Being bitterly opposed to slavery in all its forms and fearless in the expression of his views, he made

many enemies, both at home and in the south. While a member of Congress, his enemies became very bitter in their hatred on account of his fearlessness and openness in the expression of his views. The address of Hon. L. B. Wing, which is printed in this number, gives a vivid account of this part of the good man's life, and plainly sets forth the general character of the man.

Dr. Townshend was a natural born educator. Wherever he was, the conversation concerned practical affairs, the same whether out of the classroom or in. Thus he was ever interested in plans for education of the young and thus it was that he was such a power in the establishment of the colleges of agriculture throughout the land. In the address of Dr. Edward Orton, printed in this issue, is clearly outlined this phase of Dr. Townshend's character. This address by one of the bosom friends of "the father of agricultural education in America," is very valuable as being the best description of "the educator" that we can obtain.

Program.

Inspection of Townshend Hall—1:00 to 2:30 p. m.

Exercises in University Chapel at 2:30
—President Canfield Presiding.

Music—O. S. U. Glee Club.

Invocation—Dr. W. H. Scott, Professor of Philosophy.

Address—Col. J. H. Brigham, Assistant Secretary U. S. Department of Agriculture.

Dedicatory Address—Dr. I. P. Roberts, Director of the College of Agriculture, Cornell University.

Music—O. S. U. Glee Club.

Address—"A Tribute to Squanto," Dr. H. W. Wiley, Chief of the Division of Chemistry, U. S. Department of Agriculture.

Address—Hon. S. H. Ellis, Master State Grange.

In Meroriam—Norton S. Townshend, M. D., Born Clay Coaton, England, 1815; died, Columbus, 1895; The Man, Hon. L. B. Wing, Trustee of the University; The Educator, Dr. Edward Orton, Professor of Geology.

Music—O. S. U. Glee Club.

Evening Exercises at 6:00 p. m., University Armory and Gymnasium, Hon. John T. Mack, President of Board of Trustees, Presiding.

Dedicatory Address.

Delivered by Dr. I. P. Roberts, Dean of the College of Agriculture, Cornell University.

The good people of Ohio are to be congratulated. They deserve all that can be said in commendation of the results achieved in many ways during the last quarter of a century, but the efforts which have been made to teach and promulgate a more rational system of husbandry deserves the highest commendation.

Your state has the reputation of providing ample facilities for securing a liberal education. Every village and city has been provided with either a college or an academy, or both, and red school-houses dot the landscape as thickly as do mountain peaks in the "Rockies." But all this provision for educating the

people has left the larger portion of them untrained and uninformed regarding those things which are, of necessity, of vital importance to their welfare and prosperity.

Much of the old education was and is good, but beauty overtopped utility and it substituted mythology for facts, probably because it was short on facts and wanted to realize on the over-supply of entertaining stories of the ancients. It is now proposed to make the educational meal of facts and use the best of the stories for dessert. The old education began with the first dawn of civilization; the new began scarcely a half century ago. The old endeavored to train a man so perfectly on land that should he, by chance, fall into water he could swim, or, at least, keep from drowning; the new teaches both men and women to swim by exercising them in the art of swimming in water.

The old philosophers of the Orient gazed at the stars, wrote beautiful stories about them and sought to find their way to the land of the blessed through their benign influences. Unfortunately, the facts upon which their theories were based were found wanting. The modern philosophers begin with Mother Earth and spend long years in painstaking investigations to discover Nature's modes of action if happily they may find the law and thus be enabled to comprehend, in part at least, the Law Giver and to intelligently worship Him. The modern philosopher spends years to discover what part the despised angle worm plays in the great economy of Nature, what forces lie hidden in a molecule of earth, what the mysteries of life, growth and the ever changing forms of matter. He measures and weighs the earth, the stars and planets, maps out the paths they traverse through the illimitable field of space and then, with reverence founded on understanding, says honor, glory, power and obedience be unto the Maker of all these wondrous and beneficent creations.

Is the new education, which on account of its newness has not yet been fully adjusted to the old, an improvement; is it best to lay most stress on facts or fiction, to depend largely on disciplinarian and humanitarian subjects or

get discipline and secure a comprehensive view of man's duties and obligations to man by addressing our thoughts largely to Nature's modes of action, to life, motion, development and change as seen in the natural world? You answer this question here and now in most emphatic language. This vast concourse of people who have come here to witness and take part in the dedication of this grand agricultural building, these well equipped workshops and laboratories, these ample classrooms, these plantations of fruits and flowers, these conservatories, these broad acres and ample barns, all speak with no uncertain sound. All tell of your interest in the welfare of all the citizens of this commonwealth, all enter their protest against training one boy's head and another boy's hands, thereby producing two monstrosities, while the third boy is left to vegetate on the farm unaided.

TOWNSHEND AGRICULTURAL HALL.

The dedication of this building to-day breaks down forever in this state the "middle wall of partition," which has stood for ages between the so-called professional and the so-called industrial classes. As we leave this building, eradicate from your vocabulary the word "classes," as applied to citizens employed in the various avocations of life.

"Order is Heav'n's first law; and this confest,

Some are, and must be, greater than the rest,

More rich, more wise; but who infers from hence

That such are happier, shocks all common sense."

Throw wide open the doors of knowledge and "let him that is athirst come and whosoever will, let him come" and drink of the waters of knowledge freely. Guard well the narrow door which leads to the possession of a small piece of the skin of the Ovis aries as carefully as you wish, make the entrance to the college by this way only after extended preparation if it is deemed for the best, for it may be well not to make all roads

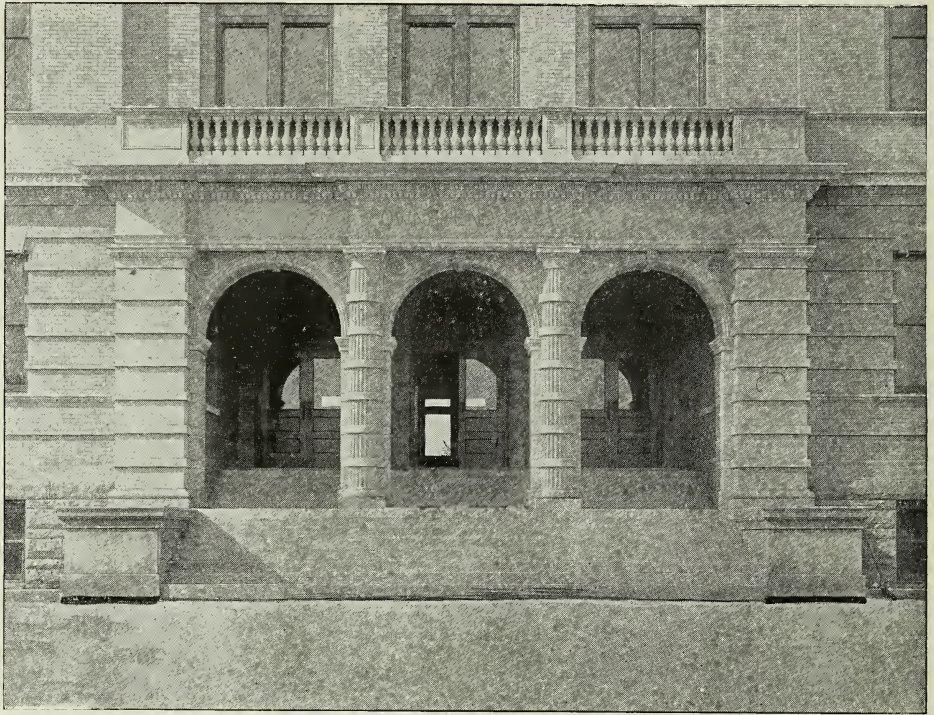
too easy. As you have placed many doors in this building, all useful but not all of the same size and finish, so provide many entrances to the various sources of knowledge and instruction which you have provided. Open postgraduate courses, summer courses and winter courses, two year courses; if possible put a part of your plant on wheels, car wheels, so that those who cannot come to college can have the college come to them. All this does not, nor should not imply poor instruction. A fact is a fact, a principle a principle, whether they be proclaimed in the red schoolhouse by a plain man or from the university classroom by a learned professor. The only precaution necessary is not to substitute opinions, however much they may be worth, for facts, nor judgment, however good, for principles which may be ever the same.

But it may be asked, what new conditions have arisen in the last half of the nineteenth century which make it necessary to provide special facilities for the promotion of agricultural education to reorganize our country and city schools, our colleges and universities? Have we no common school system, no colleges or universities which will satisfy this grumbling farmer? From the dawn of civilization up to the last half of the nineteenth century no provision had been made for giving the slightest instruction to a majority of the citizens of these United States in subjects which have direct bearing upon their chosen profession, by which they must secure both training and livelihood. A knowledge of even the simplest principles and practices of husbandry has been denied the children of the farms because the teacher lacked the knowledge and hence the ability to instruct. Our school systems are so constructed that the teacher was also excluded from securing this class of knowledge, and in fact is now, except in rare cases, unless training is secured through a long college course.

The first departure should be the establishment of a summer school of from four to six weeks in length for the public school teachers. No one should teach the children in the country or city with-

out being able to distinguish leaf buds from fruit buds, a potato from an artichoke, or a grasshopper from a locust. A multitude of objects on every hand lend themselves naturally to the mental and scientific training in the primary and secondary schools. A bug, a twig, a candle, a flower, an ear of corn, a potato, a lamb or a chicken may be the means, in the hands of a trained teacher, of opening eyes which are now sealed to the beauties and uses of plants and animals,

have met to dedicate? Everything, for from this center of thought and activity will go forth influences which will evolutionize the methods of instruction in the schools. From these halls will go forth in the years to come hundreds of youths who will be in touch with Nature in all her varied moods; earnest men who will have received a liberal and practical education; men who will interpret in a liberal spirit this mighty protest against the exclusive spirit of the



TOWNSHEND HALL—MAIN ENTRANCE.

and to secure such enthusiasm and attention on the part of the pupils as will turn the humdrum schoolrooms into one teeming with life and the pupils into earnest seekers after knowledge and truth. Then it will no longer take ten years of a youth's life to prepare for college and to secure what might easily be accomplished in five years if our methods of instruction were natural and logical.

But what has all this to do with this beautiful agricultural building which we

old; men who will grasp the broad sweep of intent of the far-seeing statesman, Senator Morrill, when he wrote the words,

"That there be granted to the several States, for the purposes hereinafter mentioned, an amount of public land, to be apportioned to each State a quantity equal to thirty thousand acres for each Senator and Representative in Congress to which the States are respectively entitled"* * * *for the endowment,

support, and maintenance of at least one college in each state * * * in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life."

This far-seeing scholar saw clearly that if progress in education was to keep pace with the growth and the wants of our people, then National aid would be required. The wording of the Land Grant Act of 1861 also provides that the State must assist in providing means for the better training of the industrial classes. Your State has responded nobly to this demand. Here, at this hour we dedicate this monument, this building, which will stand as the first milestone to sharply mark the visible expression of the beginning of the great evolution in agricultural education in this State. Here, the aim will be to turn out trained intellect and deft hands as varied in tastes and acquirements as are the plants varied in yonder wood. No more old procrustean bedsteads; opportunity for all with highest honors for the highest achievements.

But if education is to be widened until it is all embracing where is it to end? It has no end, not at least until the commonwealth has provided full and ample facilities for giving instruction, at a nominal cost, to every person, in every subject worthy of study, so far and so fast as natural limitations will permit. You have built but one building for the exclusive use of agriculture, but in the near future it will be flanked on the right and on the left by other buildings, each devoted to a special purpose. When full provision has been made by the state for giving all who desire it a liberal and a practical education, or a practical education, then will these halls be thronged with seekers after knowledge. This building, as beautiful as it is, is but the beginning of the facilities which will be required. Both simple and expensive apparatus will be needed; many additional trained men must be sought out. Nothing is too good or too expensive for the wards of this commonwealth.

This soil beneath our feet contains untold billions of possibilities. Suppose that 20,000 square miles of the 41.060

square miles of the land area in your state are arable, and that the composition of your soil is placed at the average secured by many analyses of the soils of adjoining states which gave 3217 pounds of nitrogen, 3936 pounds of phosphoric acid and 17,597 pounds of potash in eight inches of surface soil per acre, it will be seen that your soil is not exhausted, but that it is a veritable mine of plant food. Assuming these averages, which I believe are below the averages of your state, you have in the first eight inches of the 20,000 square miles of arable soil, potential plant food as follows: More than twenty million tons of nitrogen, twenty-five million tons of phosphoric acid and one hundred and twelve million tons of potash—enough plant food for two hundred crops of twenty-five bushels per acre of the exacting wheat plant. What will you do with it? Let ignorance squander it, or knowledge conserve it. By our squaw methods of farming, which have so largely prevailed during the last century, this plant food has remained dormant—unused. Nature is conservative. She treasures her secrets and buries them in the earth and reveals them not to the ignorant or the careless. She awaits patiently the coming of the trained farmer, the man who can command with intelligence, when she will obey with alacrity. This building is to be used for training men to understand natural laws and their application to the affairs of life. These unused stores are to be made useful, made to rotate through plant and animal, and the residue taken back to the soil undiminished in value. Here men are to be taught how to furnish food for the millions, how to accelerate commerce and manufactures by furnishing the material upon which they exist. As a financial investment, any state can afford to pay out untold sums for the dissemination of light and truth. It can be mathematically shown that for every dollar the Nation has paid to the colleges and experiment stations, two dollars have been returned to the people from which it came. We are slow to learn from Nature which continually discards the inferior, retains the good and goes on producing things new and better than the old.

But there is a broader and more far-reaching side to this subject. If your children are not better trained, lifted above mediocrity, they must inevitably come in competition with the swarms of untrained workers which reach our shores. Then, as a matter of self-protection for the youths living on farms, more adequate provision should be made for special training in the direction of agriculture in schools, academies and colleges, if the American born citizen is to maintain himself in the industrial world.

Let me remind you again that the people engaged in rural affairs are thousands of years behind, so far as provisions for securing a training and education in the arts and sciences which relate to their special callings. Vast sums of money, unbounded enthusiasm and wisely directed effort will be required for the next century to bring the facilities for acquiring agricultural and industrial education up to those already provided for those who enter the so-called learned profession.

One billion, five hundred million people inhabit the globe. Of the seventy millions which reside in the United States more than two-fifths get their living by husbandry and more than one-half of our people are engaged in the profession of agriculture to a greater or less extent. Of the thirty-seven and a half millions of people which inhabit the Gangetic Valley and the delta, of British India, ninety-three per cent. are engaged in husbandry. Nearly the same proportions hold true in several other thickly populated countries. Then it may be said, without exaggeration, that there are in the world at the present time a billion people whose chief occupation is farming, while only a half a billion are engaged in all the other occupations.

We need a vast number of missionaries, trained men, who are willing to carry the Bible in one hand and the implements of improved tillage in the other. Cornell is already sending such men to China and Africa. Here and there, at rare intervals, a genius has comprehended the situation. More than a century ago Jethro Tull wrote, "Men of the greatest

learning have spent their time in contriving instruments to measure the immense distance of the stars, and in finding out the dimensions, and even weight of the planets. They think it more eligible to study the art of plowing the sea with ships, than of tilling the land with ploughs; they bestow the utmost of their skill, learnedly, to prevent the natural use of all the elements for destruction of their own species, by the bloody art of war. Some waste their whole lives in studying how to arm death with new engines of horror, and inventing an infinite variety of slaughter; but think it beneath men of learning (who only are capable of doing it) to employ their learned labors in the inventions of new (or even improving the old) instruments for increasing of bread."

Or listen to the words of the distinguished chemist, James F. W. Johnston, written at the beginning of this century:

"That art on which a thousand millions of men are dependent for their sustenance, and two hundred millions of men expend their daily toil, must be the most important of all; the parent and precursor of all other arts. In every country, then, and at every period, the investigation of the principles on which the rational practice of this art is founded, ought to have commanded the principal attention of the greatest minds."

Or take in the full scope and meaning of those words written by the wisest of men:

"I went by the field of the slothful, and by the vineyard of the man void of understanding; and, lo, it was all grown over with thorns, and nettles had covered the face thereof, and the stone wall thereof was broken down. Then I saw, and considered it well, I looked upon it, and received instruction."

The man of understanding! More than a billion of them waiting for the college boy to enlighten them. A billion patient workers waiting through the centuries for light, knowledge and training. Waiting while the educated world wrangled about total depravity, predestination, Jonah and the whale, forms of church rights and church government. Waiting through the long years while

Mohammedans, Christians, Jews and Gentiles slaughtered each other. But the dawn of better things is here, and I congratulate you on the provisions which have been made here at your State University for joining in the most far-reaching educational work which has ever been placed in the hands of trained men.

A Tribute to Squanto.

Address Delivered by Dr. H. W. Wiley,
Chief of the Division of Chemistry,
U. S. Department of Agriculture,
ure, Washington, D. C.

Speculations concerning the origin and destiny of man have always been a favorite pastime of philosophers and theologians. If man really had his origin in all the ways which have been seriously and facetiously described, the difference in races and individuals are no longer a matter of wonder. If at the end, the race be disposed of in harmony with the several notions relating to his destiny, the future state of man will not be obnoxious to the charge of monotony.

The theme of this discourse is far less pretentious than the scope of discussion outlined above. It accepts man as he is without a question as to his origin. It dismisses him finally without predictions as to his future state. As becomes a theme suggested by the dedication of a building devoted to agriculture, it is of the earth earthy. The wings of fancy which might carry the poet into either are changed into plodding feet which never lose touch with the ground.

But the toes, as is also becoming, are pointed to the coming years, but not so far advanced as to prevent the heels from being buttressed against the solid facts of the past. The true value of vaticination is vastly increased by adhesion to verity. My prophetic eye to-day, therefore, peers into the depths of another century, not to catch the glint of marching bayonets, nor to hear the sound of forensic eloquence. Nor does it look across the sea to trace the progress of

events on that ground where nearly all history has been made. On the contrary, it scans only our own land, and for the sole purpose of ascertaining, in a modest way, how agriculture is to feed the three hundred million mouths that will be opened for food in these United States on the good day of our Lord, January 1, 2000. Every college boy who has advanced to his senior year is familiar with the leading theories of so-called economic science on this subject. It is quite surprising with what accuracy the comfortable college professor sets limits to the number of our inhabitants and the products of agriculture. The alluring theories of Adam Smith and Malthus have never lost their dominant influence in those cosy libraries where the well-fed professor, with his gastric glands in full function on a good dinner, tells us of the near starvation of man. Our virgin soils he says are exhausted. The average of field crops is decreasing. This country has reached its maximum limit in the production of food stuffs. In a few years we will be importing meat and bread. The increase in our population will soon be checked by the limits of subsistence. Every energy of man will be used up in the struggle for existence. Progress will be arrested, and humanity having reached its full flower and fruit, will soon enter upon that era of retrogression which is the natural course of all human events.

Such are the dicta of the lecture room and of the magazine.

I do not believe that this pessimistic view of the near future of man is based on fact, nor sustained by tenable theory. In support of this statement, I propose to discuss very briefly some of the relations of the new agriculture to the sustenance and welfare of man. As a basis for the proper study of this great subject, the following data may be considered:

The total area of the United States, exclusive of Alaska, is 1,936,523,520 acres. Of this, 1,900,939,520 acres are land, and 35,584,000 water.

Of the total area in land, about one-half is arable, so far as its contour is concerned, and a large portion of the

rest is in forest or grass. The portions not arable consist of the rocky, broken and mountainous regions. This portion is practically useless for agricultural purposes.

Of the total land area, 700,000,000 acres are in the arid, and 200,000,000 acres in the semi-arid regions. Only those portions of these vast areas, comprising nearly half the area of the United States, which can be irrigated can be considered as strictly arable land. According to conservative estimates, about 5 per cent. of the area of the arid regions can be eventually brought under irrigation, that is a total of 45,000,000 acres. The possible area of arable farming land in the United States is therefore about 700,000,000 acres, or practically one-third of the whole. From this number must be deducted the area of yards, roads, lawns, farmyards, parks, cities and other reservations, so that the total area of the United States which is fit for the plow may be safely placed at about 600,000,000 acres. Of this area large portions will remain permanently in forest and devoted to other purposes, so that we may regard for the present as the maximum area of the United States which will be turned by the plow 500,000,000 acres.

From the data contained in the eleventh census, we learn that there are in the farms of the United States 623,218,619 acres, of which 357,616,755 acres are improved, and 265,601,864 acres unimproved. I shall endeavor to show that by a proper application of the principles of scientific agriculture, now well understood, we can easily support one person on each two acres of the actual arable land in this country, or a total of nearly 300,000,000 souls. The total area of Belgium is 7,278,720 acres, and its population 6,410,783, or nearly one for each acre. Ohio resembles Belgium in contour, climate and fertility of soil. Ohio has an area of 26,131,200 acres of land, and, measured by the Belgium standard, could easily feed 20,000,000 people. Ohio is only an example of what other portions of the United States could do.

It would be too much of detail to give here all the agricultural products of the

vast area covered by the above data. It is enough to know that with the present method of farming the quantity of food and clothing produced is far greater than is needed by the 73,000,000 people now within our borders. A glance at the table of exports and imports of agricultural products shows that we are now feeding, in whole or in part, fully 40,000,000 people in other quarters of the world.

In a short space I shall try to show how the scientific agriculture of the future will easily provide for all the demands which a rapidly increasing population will make upon it. In the illustration of this statement I shall refer only to a few of our staple products, and first of all, wheat. The adage "Bread is the staff of life" should not be taken too literally, but in a more diffused sense, bread represents especially the cereal crops. Among these wheat is second in quantity, and first in its importance as a direct human food. Our average product of wheat for a period of ten years is 12.7 bushels per acre. This rate of production is practically a minimum. It is what the patient soil will produce under a regime of chronic robbery. The average production of wheat for a period of fifty years in a soil at Rothamsted which has never received a particle of manure during the time specified, is 13 1-2 bushels per acre. A part of the same field, properly manured with barnyard manure, has given an average yield of 33 1-2 bushels per acre. * * *

We have spoken only of the grain of Indian corn, and in this is not included more than half of the true value of this marvelous plant, the discovery of which was almost as important as that of the American continent itself.

Profligate nature stores in the stalks of the Indian corn a greater quantity of food than she deposits in the grain. Only lately have the experiment stations shown the high food value of the dry stalks, millions of tons of which are annually burned on the vast plains of our maize belt. The value of the dry stalks alone for cattle food is nearly as great as that of the ear. But in the fresh stalk are found large quantities of sugar, one of the best fattening foods in the world.

At the time the grains of the ear are fully formed and firm, but before they are dry, the stalk contains its maximum amount of sugar, fully 12 per cent. of its weight. For every average acre in maize, 3000 pounds of sugar are produced. In the natural drying of the stalk, in autumn, this sugar ferments and is distilled into the air, Nature's proof spirits, both of the sunshine and moonshine stills, although ungauged and unstamped by any collector of inland revenue. No wonder our friends in Iowa are such strict Prohibitionists, since they may, on any warm day in October after a heavy frost, drink into their lungs in nature's big saloon rich draughts of this prairie dew.

Mixed with a small ration of cotton seed or flax seed cake, or beans or peas, this waste sugar of the maize fields would fatten every steer, pig and lamb in the country, and there would be enough left over to feed all the cattle, horses and sheep of the whole world. With all this wealth of material available, what need have we to tremble before the boggy men of Malthus and his disciples.

I have spoken of the possibilities of increasing the yield of our staple crops and consequently of increasing, almost indefinitely, the sources of human food. There is another important line of progress along which scientific agriculture will help in this work. I refer to the methods by means of which the character of a crop or of an animal may be changed by scientific selection. * *

In the methods of using foods also great progress has been made and greater still is to be expected. It is possible, with the information which we now possess, to put a pig of a given weight on the market at only about two-thirds of the expense that formerly attended this process. By a careful study of the character of the food, it is possible to balance the rations in such a way that each type of food exercises its maximum nutritive properties. This has already been accomplished, to a large extent, in the farmyard and it is possible to apply similar principles also in the diningroom. Just as a chain is as weak as its weakest link, so a food is as poor as its poorest

typical element. In the proper balancing of the rations, and in the appropriate mechanical preparation and in the cooking of the food large economies can be effected and the progress and welfare of the race promoted.

According to our present system of grazing and feeding, from two to three acres of land are required for the sustenance of a dairy cow, while in the grazing or range area of the west the area is much larger. Last summer, I had the pleasure of seeing a method of green feeding practiced by the Minnesota Experiment Station, in which it was demonstrated that a cow or a sheep could be kept on practically one-tenth of the area above described. It was remarkable to see in evidence before us the animal living and flourishing on an area which was so small as to seem almost impossible. Yet this simple experiment has demonstrated what can be done in a scientific way in increasing the number of food animals which can be sustained on a given area of land. Having shown how our product of the cereals may be easily doubled or increased three-fold on a given area of land, it is interesting to note that it has also been demonstrated by scientific agriculture how the number of food animals sustained on a given area can also be increased two or three-fold. Thus it is not only bread which we are to furnish, but also the meat, which will be forthcoming in proper quantities.

Of the vast area of our arid regions we need not wholly despair. According to conservative and competent authorities, it is estimated that with the visible supply of water at least 5 per cent. of this region may be subjected to irrigation. This area alone would add immense stores to our granaries. On irrigated lands it already pays to practice intensive agriculture. Extensive agriculture will not pay on land which it has cost \$50 or more per acre to reclaim and prepare for the seed. At the present time one acre of irrigated land means as much as three of ordinary land in furnishing agricultural products.

The coming triumphs in agricultural science will not be confined to our pres-

ent arable soils. The arid wilderness is to be conquered, and even the snows be robbed of their terror. When the surface water has been used up the inexhaustible subterranean streams still remain. The very blizzards that sweep down upon us from the far northwest will be harnessed and made, by the medium of electricity, to furnish us with heat and light.

The superficial changes which man will make in the cold and arid regions cannot fail to produce a profound impression on the rainfall. Forests will rise to check the fury of the northwest winds, and to change the physical condition of the soil and subsoil. The tamed elements of nature will be pressed into service, and in the end, help along with the work which they at first so strenuously opposed. We may not be able to bring back those tropic breezes which lured the megatherium and the pterodactyl to linger about the boreal regions. Those times

"When the sea rolled its fathomless billows

Across the broad plains of Nebraska,
When around the North Pole grew bananas and willows,

And mastodons fought with the fierce armadillos

For the pine apples grown in Alaska."

But as in the future we shall laugh at the lack of moisture, so shall we mock the snow and the blizzard.

It only requires a simple calculation by an electrical engineer to show that if all the energy of the winter's northwest winds were converted into heat by means of windmills and dynamos, the North Dakota farmer in January might be seen mopping his brow vigorously, and fanning himself as he trimmed his orange trees.

We have also practically inexhaustible sources of heat close beneath the surface of the earth. The frost never penetrates more than a few feet below the surface. At a comparatively small depth a summer temperature is reached. It is entirely probable that man may draw upon the interior of the earth for

supplies of heat for warming his habitation and growing his green vegetables under cover in winter. * * *

Scientific feeding of animals is yet a new science, but it has already shown how to put beef and pork in the market at less than two-thirds of the cost of fifty years ago. The science of man feeding is only in its primer. The science of field feeding is still learning its alphabet.

From the streets and sewers of cities, from the deserts of Chili and Arizona, from the islands of the Pacific and from the oceans and seas the future farmer will draw the food to feed his fields.

In the geologic ages of the distant past, before the dawn even of primitive agriculture, provident nature garnered the migratory elements of plant food in stores whose extent and richness are yet but little known. In the case of potash, only one locality in the whole world has been exploited, and that only partially. But even in the deposits of Stassfurt and vicinity are found stores of potash which our successors at the end of a thousand years may freely draw on. The conditions which determine the deposits of potash in that locality are not unique, and there is every reason for believing that others equally extensive will be discovered. The decomposing granites and other potash bearing rocks are affording over wide areas additional stores of this food, so eagerly eaten by plants, and so necessary to the formation of carbohydrates, one of the principal foods of animals.

The stores of nitrate of soda on the pacific coast of South America show no signs of exhaustion. In the arid basins of Southern California and Arizona are found large deposits of soils containing from 5 to 20 per cent. of nitrates. These deposits have been formed in past ages of the earth from the decay of marine vegetation and animal remains. Deposits of guano are formed chiefly from the debris of birds, mostly of marine predatory habits. In the little frequented islands of the Hawaiian group these deposits are now forming, as is shown in photographs I have lately seen, in which large areas are completely covered with birds and their eggs.

The bones of marine and terrestrial animals, man included, are never wholly lost to agriculture. In this country alone are found deposits of phosphates in South Carolina, Florida, Pennsylvania and Tennessee, large enough to feed our crops for many milleniums. Thus the three most essential plant foods, namely, phosphoric acid, potash and nitrogen, are stored on every hand in forms not obnoxious to decay, and in places accessible to man.

"There is no death, only atomic changing,

When life from one form to another passes,

And new life comes but from the rearranging

Of the old parts in new atomic masses.

The sea, the miser of the vanished ages,
Gives up its cherished dead to weed and coral,

And from the tombs of heroes and of sages

Spring fields of corn and fragrant beauties floral.

The dust of Caesar, through the centuries sifting,

Will reach new life, and feel the thrill of being;

No grave so deep, the storied shaft uplifting,

As darkened eye to keep again from seeing.

The very bread, which you to-day are eating,

Has passed from earliest aeons through life's phases,

The circle of eternal life completing,

Secure, untouched, through all its mystic mazes."

The sea is the final receptacle of the plant food, which seems to be hopelessly lost. The rain dissolves and carries away the elements which escape absorption by the plant. The streams and rivers finally carry these precious stores into the ocean, where they, to the thoughtless observer, are forever hidden. But not so. The sea is the great

conservator and sorter. Nothing which enters these apparently unathomed depths escapes attention. Mineral substances of like nature are brought together and deposited in layers of various thicknesses, which subsequent changes of level in the earth's crust render available. Seaweeds and algae seize on the soluble portions of this waste of matter and fix them in their tissues. Afterwards this vegetable matter serves for the nourishment of marine animal life, or is cast upon the shore, and becomes directly useful to man for the fertilizing principles it contains. Marine animal life feeds on other stores of waste matter, and converts them into forms suitable for food for man and for fertilizing purposes. Vast stores of oil, human food, nitrogenous and phosphatic fertilizers are thus rescued annually from the depths of the sea.

I have not considered at all in this relation the possibility of producing foods and other agricultural products by direct synthesis in chemical laboratories. We must realize the fact that chemistry has made great advances in this direction within the last few years. The chasm between the organic and the inorganic has been completely bridged over, and it is possible now for the chemist to commence with inorganic materials and to proceed step by step until he is able to form from them true organic compounds. * * * *

Even if food products can be formed in the crucible there is no excuse whatever for supposing that they can ever play any role in an economic sense. The untold billions of laboratories which nature builds are infinitely cheaper in construction and operation than those filled with platinum and porcelain. The sun ignites the crucibles of nature at an expense far less than attends the use of the city gas works. The director of nature's laboratory depends on no endowment nor legislation for his salary and his bills for supplies are not disallowed by any board of auditors on the score of economy. Night and day his patient, faithful assistants work without thirst for fame, without hope of reward. They fight not for priority of discovery, and their anonymous papers are printed in rich profusion in the great *Berichte* of

the universe. The chemistry of the chlyrophyl cell is far more wonderful than any of the achievements of Lavoisier, Berzelius, or Fischer.

It would doubtless be a solace to the weary toiler in the sun to look forward to a time when he might lie in the shade while proteids were pricking up their ears in the condenser and fats frying in the scientific pan. But in the days of the far future, while Berthelot will still be honored, and Fischer praised, the farmer will be found following in the furrow, fields of waving grain will brighten the landscape, and herds of kine graze upon the hills.

The agricultural colleges and experiment stations point out the way and demonstrate the practical methods to be pursued in converting extensive into intensive agriculture. The work of these great factors in political economy is still in its infancy. The era of accomplishment is hardly inaugurated. We are now only in the midst of preparation for the advance which is to come. To teach the art of conserving and utilizing to the best possible effect all the sources of supply that is the glorious future of agricultural education and experiment. The progress of humanity is not a breeder of poverty, but of wealth. For every additional mouth are provided two additional hands. The human race is not a Poylphemus, blinded by the wandering Ulysses of education, and doomed to a hopeless struggle in the dark. Clear of vision, firm of purpose, it pushes on to its final destiny. Depending wholly on agriculture for subsistence, it looks to the field for that future support which will bear it on in greater achievements. The more dense the population, the greater the happiness, the greater the progress of the race. It is not work in the field that has caused our agricultural population to contribute so large a percentage to the inmates of our insane asylums; it is isolation. Scientific agriculture will bring men closer together. It will make the village, and not the isolated farm house, the center of residence. It will turn Ohio into a Belgium, with 20,000,000 people within her borders, not slaves to ignorant labor, but beneficiaries of en-

lightened agriculture, which will bring plenty to the granary, ease to the evening of labor, and refinement to the parlors of the poor. It will show the absurdity of the Malthusian myth, and the speciousness of the Georgian pessimism. Our people are not going to starve. The mission of the new building this day dedicated to agriculture will not be in vain.

On the threshold of this new birth of progress and of possibility it is meet that we should not forget the humble beginning of things. Monuments and memorials are rising to Liebig, to Berthelot, to Gilbert, to Morrill and to Hatch. We mention with gratitude the names of Storer, of Johnson, of Caldwell and of Hilgard, and we gladly join in every acclaim of the services which they and many others have rendered to the cause of agriculture. But there is still one to whom we owe a debt, and whose name is never heard, a true and typical American, whose majestic figure we may never see in bronze and marble. Some 300 years ago he stood on the shores of Massachusetts Bay, where the eager east wind, as now, often made life a burden. The sturdy white men, lately transplanted from over the sea, were not looked on with much favor by many of his brethren. His philanthropy, however, went out to them, and it was he who, in those early days, taught our ancestors the first principles of scientific agriculture. He laid the foundation of that system of experiment which is the basis on which our agricultural colleges and experiment stations of to-day stand. Listen to the simple record of his work:

The honor of teaching the American colonists the use of artificial fertilizers belongs, without doubt, to an Indian named Squanto. In Governor Bradford's "History of Plymouth Plantation," is given an account of the early agricultural experience of the Plymouth colonists. In April, 1621, at the close of the first long dreary winter, "they (as many as were able) began to plant their corn, in which service, Squanto (an Indian) stood them in great stead, showing them both ye manner how to set it, and after how to dress and tend it. Also he tould them, axcepte they

got fish and set with it (in these old grounds) it would come to nothing; and he showed them yet in ye middle of Aprili, they should have store enough come up ye brooke by which they begane to build and taught them how to take it."

Another account mentioned by Goode of the practice of the Indians in this respect may be found in George Mourt's "Relation or Journal of the Beginning and Proceedings of the English Plantation settled at Plimouth in New England, by certain English Adventurers, both merchants and others, London, 1622." "We set the last spring some twenty acres of Indian corn, and sowed some six acres of barley and peas, and, according to the manner of the Indians, we manured our ground with herrings, or rather shads, which we have in great abundance and take with great ease at our doors. Our corn did prove well, and God be praised, we had a good increase of Indian corn, and our barley indifferent good."

Thomas Morton, in his "New England Canaan," London, 1632, wrote of Virginia: "There is a fish (by some called shads, by some, allizes), that at

the spring of the yeare passe up the rivers to spawn in the pond, and are taken in such multitudes in every river that hath a pond at the end that the inhabitants dounge their ground with them. You may see in one township a hundred acres together, set with these fish, every acre taking 1000 of them, and an acre thus dressed will produce and yield so much corn as three acres without fish; and (least any Virginea man would inferre hereupon that the ground of New England was barren, because they use more fish in setting their corne, I desire them to be remembered, the cause is plaine in Virginea) they have it not to sett. But this practice is only for the Indian maize (which must be set by hands), not for English grain; and this is, therefore, a commodity there."

We look back to-day, therefore, three centuries to the very beginnings of American agriculture. To that dusky figure, proud in the simplicity of his fortune, let us to-day turn our eyes. For that service which he rendered the struggling pilgrim, and for that example of scientific agriculture let us to-day bring this tardy tribute to Squanto.

IN MEMORIAM.

NORTON S. TOWNSHEND.

THE MAN.

BY HON. L. B. WING, Trustee of the University.

Mr. Chairman, Ladies and Gentlemen:

In the assignment of the duties of this occasion, it comes to me to give a short sketch of the events and incidents in the life of the man whom we honor to-day. Many of these events are now matters of history, familiar to the older people of the state. But the younger generation are but dimly impressed, or have altogether forgotten them, in the unceasing march of the "things of this present."

NORTON S. TOWNSHEND.

was born on Christmas Day, 1815, in Northamptonshire, England. He was the only son of a substantial farmer, who was himself the possessor of a fair education and of a good library. In 1830 the father came to America with his family and settled upon a farm at Avon, in Lorain County, Ohio. In England, busy with farm work, the son had found little time to attend school; but he was the

constant companion of an intelligent and judicious father and a most exemplary mother, who encouraged him in his love of books and especially in his early liking for the natural sciences. When nineteen years of age young Townshend taught a district school in this state. Of this experience I have heard him say that the work was not less instructive to himself than to his pupils.

In 1837 he commenced the study of medicine with Dr. R. S. Howard, who was a physician at Avon, but who was afterward a Professor in Starling Medical College in this city.

At the age of twenty-three he attended a course of lectures at the Medical College in Cincinnati. At this time Mr. Townshend was a fine specimen of physical manhood, being five feet, ten inches in height, robust in appearance, weighing about two hundred pounds; with blue eyes and a fair complexion. He had never enjoyed the advantages of a connection with a foot-ball team, nor had he tested his powers of endurance on a running track in a modern gymnasium: but with his extra clothing tied in a bundle and slung upon a stick, he had trudged on foot across the state, from Lorain to Hamilton County, to attend these lectures of medicine.

Though of great strength of will and robust in physique, he was gentle and humane—a friend always of the weak and unfortunate—it seems perfectly natural that he should sympathize with the bondsmen of the South, some of whom he had seen in Northern Ohio on their northward travels by the underground railroad—the only railroad then in operation in this state. While in Cincinnati he was an observer of an event which engaged his liveliest sympathy and intensified his dislike of the institution of slavery. A Southerner visiting Cincinnati brought with him a slave girl named Matilda, who ran away when her master was about to return south. She was captured, placed on trial for rendition to bondage, and stood before the court without a defender. Presently a young man, about the age of Townshend, pressed his way through the crowd and offered his gratuitous services as the poor slave's attorney. The defense which this young

volunteer gave to his client was eloquent and masterly. Townshend inquired the name of the speaker. The answer was, Salmon P. Chase. The life-long friendship of Mr. Chase and Dr. Townshend dated from that day.

Mr. Townshend spent the next year and a half in Elyria, with his preceptor, Dr. Howard; graduating in 1840 from the University of the State of New York. Immediately upon receiving his degree of M. D. he sailed for England, for the purpose of attending lectures in European medical schools and hospitals. He also received a commission from the Anti-Slavery Society of the State of Ohio to appear as its delegate at the World's Anti-Slavery Convention, held in London in June, 1840. This appointment afforded him the opportunity of seeing, hearing and becoming acquainted with some of the ablest and most philanthropic men of all nations. As soon as the session of this convention was closed he repaired to Paris, where he remained until 1841, occupied with public and private courses of instruction given in that great medical metropolis, and incidentally gave much time to the study of the French language. After leaving France he attended lectures in the University of Edinburgh. He visited Dublin, spent a few more weeks in London, and then returned to Avon. In the fall of 1841, he commenced the practice of medicine in that locality. In 1844 he married Harriet Newell, daughter of James B. Wood, formerly of Massachusetts, and removed to Elyria, in the same county, where he entered upon a large surgical and medical practice, which continued for the next ten years ensuing. His wife died during this period.

In the fall of 1848 he was elected by the Abolitionists of his County to the State Legislature, though opposed by the candidates of both the Whig and the Democratic parties. He was instructed by his constituents to act as their representative "with any party, or against any party, as in his judgment the cause of freedom should require." This instruction referred especially to the election of a United States Senator, that being the most important duty with which the new General Assembly was charged. In the House, the Democrats and Whigs

each lacked one of having half the number. Outside the factions thus antagonized were two Free Soil members, Dr. Townshend and Col. John F. Morse of Lake County. These two had gained their seats over the opposition of both the Whigs and the Democrats and were therefore independent of both. Without the votes of these two members, as the parties were divided, no organization could be effected. William Allen was the Democratic candidate and Thomas Ewing that of the Whigs. Joshua R. Giddings was the choice of Morse and S. P. Chase that of Townshend; but both Morse and Townshend were much more ardent in their desire for the election of a reliable anti-slavery man than in their preference for any particular person; and above everything else they hungered and thirsted for the repeal of the unjust "Black Laws" of Ohio. Thus holding the balance of power, after a deadlock from December 4 to December 23, this power was so used as to secure an organization of the House, the repeal of the Black Laws, and the election of Mr. Chase to the United States Senate. Stanley Matthews, a young man who had been an editor of a newspaper in Cincinnati, was then, on motion of Dr. Townshend, elected Clerk of the House. A very full and interesting account of this legislative crisis, and the part taken in it by Dr. Townshend, has been written by Col. Alfred E. Lee of this city, in a magazine article of April, 1895.

In 1850 he was elected a member of the Constitutional Convention which framed the present constitution of Ohio. This election was again a personal triumph over both the Whig and Democratic candidates. In the same year he was elected a member of the Thirty-second Congress—where he was brave and outspoken when it was no child's play to manifest such characteristics.

On one occasion a member of the House from North Carolina, in the course of debate, made a sneering allusion to Townshend's English birth. His reply gave his fellow members a taste of his qualities as a ready debater. These were some of his words:

"A man does not choose his birth place, so I do not consider it a subject of either glory or shame. Could I have

chosen it, I would not have selected any other spot,—on one hand was the field of Naseby where that stern apostle of liberty, Oliver Cromwell, overthrew the power of the royal tyrant, King Charles I. On the other hand was the river Avon, whose waters flowed by the birth-place of Shakespeare. Could any spot be more suggestive of all that is heroic and glorious in action, or of all that is true and beautiful in expression? How much I owe to these associations I cannot tell, but this I know, that Cromwell and Milton, and Pym, and Vane, and Hampton, are among the saints in my calendar, and I trust that I cherish something of their hatred of oppression.

"I think men may understand and appreciate the principles of civil liberty though not born on this continent.

"The Pilgrim fathers were not behind in this particular, though foreigners, like myself.

"The portrait that hangs before me reminds me of another foreigner (La Fayette) who understood the advantages of free government and to whom this country owes her gratitude.

"Persons born within the limits of a monarchy are not necessarily Monarchists. The fathers of the Revolution, Washington, Jefferson, the Adams' and Patrick Henry were born under the same Monarchical Government as myself. It is true that men born under a free government and who have known no other, have not always the best appreciation of the value of freedom. How will you explain the fact that the sons and grandsons of those who fought and died in the War of the Revolution to secure the liberty we enjoy, are now, in the Southern states, laboring with an equal zeal for an opposite purpose, to extend and perpetuate the curse of slavery? The true friend of freedom would scorn alike to be a slave or to own one. Some men are Republicans from choice, and some are so only by accident. After seeing the evils of other forms of government I prefer that under which I live.

"I have to say further to that gentleman, that my constituents consider themselves entirely competent to select their own representative; they will not ask his advice. For myself I will add that representing a hundred thousand freemen,

I shall take the liberty to speak as I please and when I think proper, without asking special permission of any man, and least of all one who comes here the representative of whips and manacles and slaves."

The speech, of which the above is an extract, was delivered June 23, 1852, and the remainder of it was an able argument against the policy of carrying slavery into the western territories.

There were rampant slaveholders then in Congress, and the domineering spirit, which a few years later culminated in the brutal assault upon Senator Sumner, was already felt in the National Congress. Townshend, a new member of the House, and Ben Wade in the Senate, were repeatedly made the subjects of it. Townshend had made several strong anti-slavery speeches on the floor of the House, and one morning he received a call from a friend of Congressman Stanley, of North Carolina, with a challenge to fight a duel.

"What does Stanley want?" asked the athletic and vigorous Ohioan. "Does he want to kill me or does he want me to kill him?"

This abrupt question, and the manner in which it was put, surprised the friend of Stanley.—"I think, Mr. Townshend, he does not want either, but you have made several offensive speeches in the House, and Mr. Stanley feels that it is due to himself, and to his constituents, that you retract your offensive remarks or accept the alternative."

"We do not fight duels in Ohio," said the Doctor deliberately. "Public sentiment there looks upon it as murder. I will not fight Mr. Stanley in this way; but you can tell him, if he still insists, that we will go out and fight it in my way."

"When I went to Ohio, all sorts of game was plenty, and I am accounted a dead shot with a rifle. I spent over a year in Paris studying my profession, and while there, took pains to become expert in the use of the small sword. I expect if Mr. Stanley insists upon fighting he will find me ready and fairly well prepared to defend myself in my own way."

The Southerner stated that he did not think that Mr. Stanley wished to fight,

except with the weapons commonly used by gentlemen, but that he would report to his principal. The Doctor was never challenged again.

I have quoted from his speech and the accounts of that to illustrate and exemplify the brave and fearless character of the man.

In 1853 he was elected to the Ohio State Senate. While here he presented a memorial to establish a state institution for the training of feeble minded children. The measure carried, and Dr. Townshend was appointed one of three Trustees to carry the plan into effect—a position he held by subsequent appointments for twenty-one years. During all that time he gave unremitting attention to every detail affecting the welfare of the institution. The present great asylum in this city, the best of its kind in the world, stands to-day as much a monument to Dr. Townshend's love of humanity, his wise foresight and indomitable will, as does this building, which bears his name, to his efforts in behalf of industrial education.

Dr. Townshend was a member of the State Board of Agriculture for many years, and more than once its President. In 1854 he married Margaret A. Bailey, the daughter of a clergyman of Clarksburg, Va., and a popular teacher in "Putnam Seminary," in Zanesville. In 1863 he was appointed a medical inspector in the army with the rank of Lieutenant-Colonel, and served to the end of the war. He was one of the first Board of Trustees of this University—the board which selected this site, erected the first building and prescribed the first course of study. He afterward was elected Professor of Agriculture, Botany and Veterinary Medicine—and retained his connection with it until his death, July 13, 1895, at the age of eighty years.

I remember that on the day when he was laid to rest, the sad news was flashed over the wires to the city of Denver. The Ninth Annual Convention of the Association of American Agricultural Colleges and Experiment Stations was there in session with its representatives from more than twenty states; our own University being represented by Professor Hunt, Professor Lazenby, Professor Robinson and myself; and when

somebody in the great audience announced the death of Dr. Townshend, the sympathetic thrill which came to us was by no means confined to his Ohio associates. Professor Burrill, of Illinois, presented next day a tribute to his memory and character, eloquent and truthful, which was entered upon the minutes of the Association.

I know I have talked too long; yet I have made but a most imperfect reference, in chronological order, to the events of this busy and useful life. One of his colleagues, whom we all delight to hear and honor, will hereafter speak of his work in behalf of Agriculture.

I can think of no more fitting words with which to close, than those which I found on a scrap of paper lying loose in one of Dr. Townshend's books and in his own handwriting. Whether his own or not, they tell the story of his death—or, better, of his entry upon a larger life.

"We see ripeness everywhere, not only in fruits and seeds, but in the woods, the thicket and among wild plants. Even the leaves finish up their season's work and prepare to fall. During its young and vigorous life the leaf holds fast to the stem. In its axil, or where the leaf or leaf-stalk joins the stem, is a bud. This is to continue the growth after winter. The office of the leaf, or one of its offices, is to nourish and protect the bud; it may be a leaf or a fruit bud. When it has perfected this bud, it prepares to fall. The line of separation appears, a skin is formed so as not to leave an open wound, and in due time the ripened leaf falls to the ground.

"So passes, in a well ordered life, the head of the household. The vital forces, the activities of middle life, attach this leaf very strongly to the branch; as the ripening, mellowing influences of passing years begin to be felt, in his axil or home, appears that which is to be a continuance of his life in another generation: its care and guardianship become the chief office of his existence. When the paternal leaf has done what it could toward perfecting this bud, it prepares to fall. The line of separation appears. The processes of Nature are so ordered that no harsh or open wound is made,

when in due time this ripened leaf, having fulfilled its earthly mission, falls, gently, to the ground."

The Educator.

BY DR. EDWARD ORTON, Professor of Geology.

The title "educator" is a proud one. It stands for one of the most important functions of modern life, for one of the main factors in the progress and advancement that man has been making since he began his career.

To deserve the name, one must have at least two marks. In the first place, he must have something to teach to his fellowmen. He must know something that they either desire or need to know; something, the knowledge of which will enlarge and enrich their lives, or something, through the want of which they are doomed to narrower circuits and more meagre fortunes.

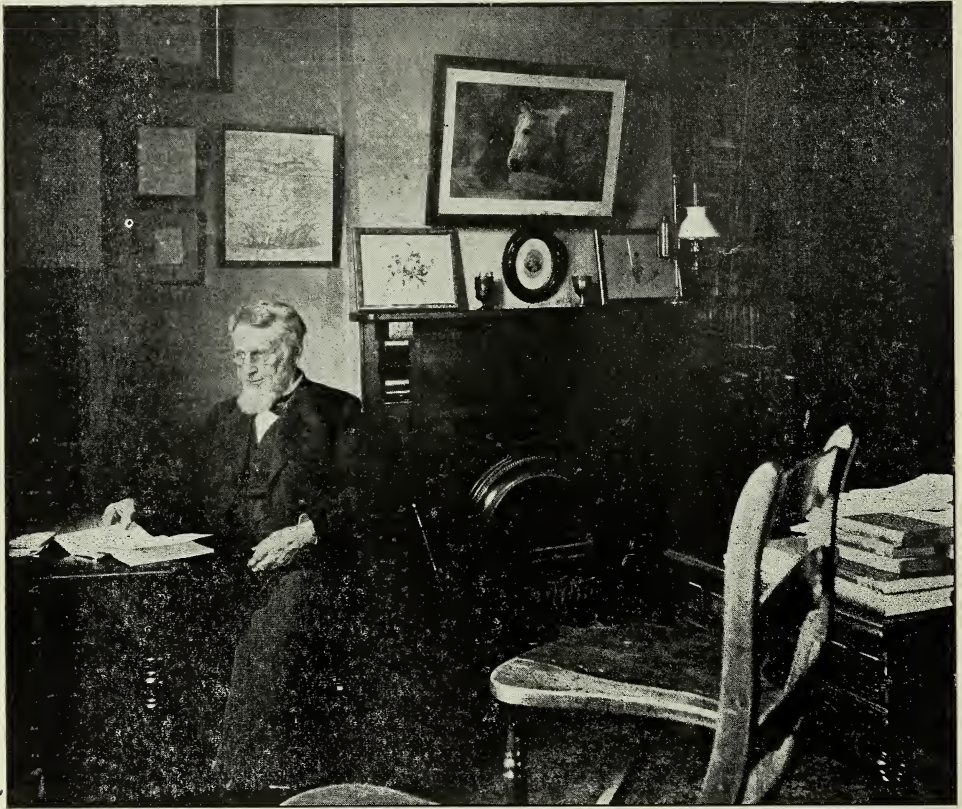
But, a merely intellectual equipment is not enough for the educator. Beside the possession of some special and valuable knowledge, he must, in the second place, have a large measure of sympathy with his fellow men. He must desire to serve their real interests, to improve their actual condition. He must be willing to take trouble for himself to increase their advantages. He must have learned in some school—I know of but one in which the lesson is taught—that "it is better to give than to receive."

This second mark or qualification that I have named, belongs in the list of moral forces. Like the first, it is indispensable to the educator. No man who lacks it deserves to be called by this great name.

I call Dr. Townshend an educator because he fully meets the two demands that I have recognized. He saw something, *knew* something that he felt sure the world needed to know, and he was ready to urge and reiterate his message, in season and out of season, often, without adequate recognition, always, without adequate reward. It was the transformation of the *art* of agriculture into the *science* of agriculture to which he felt himself called to be an

apostle. The *art* he had learned at the right time of his life and in the best possible way, namely, in the years of his youth and under his father's tutelage and guidance. Perhaps, practical agriculture was nowhere in the world carried on more systematically and more skillfully, 100 years ago, than in that part of central England in which he was born and reared. His father was well qualified to be his teacher, for he knew the best agricultural practice of his day. In other words, he was a well-trained and successful English farmer of the time to

amples of tillage and farm management, good, bad or indifferent, which were to be noted on this hand and on that; and also to the nature of the various crops, the soils to which they were best adapted and their relative advantages to the farmer; to the livestock, cattle, sheep and swine, some of which were from time to time examined with reference to purchase for the home farm. In this and other ways the lad acquired a familiar knowledge of the best farming practice of his time. Better than this, he came to feel in full force, the perennial and



DR. TOWNSHEND IN HIS LIBRARY.

which he belonged. I have heard Dr. Townshend speak of the lessons he learned while a boy as he accompanied his father on his business errands through Northhamptonshire. As they traveled through the pleasant roadways, the father would call the attention of the lad riding by his side to all the ex-

indestructible charm of that close contact with nature which the farmer's life, more than any other, affords. All these impressions were deepened and strengthened when young Townshend came with his parents to the new world and there saw a large tract, but lately reclaimed from the primeval forest, transformed

before his eyes, and, in considerable part, by his own labor, into the model farm of northern Ohio.

But you remind me that when he reached man's estate, he adopted forthwith the profession of medicine. I answer that in his case it was not the exchange of one calling for another, but rather the addition of one calling to another. He did not cease to be a farmer when he became a doctor. In fact, as the event abundantly proved, he did not become a farmer in the highest sense of the word until he had gained a medical education. In other words, his medical training reacted upon and reconstructed his agricultural interest.

Of his medical training, you have already heard; how he gained the best knowledge available in his day, by studying first with a successful practitioner near his home in northern Ohio, and later by studying at several of the leading colleges and hospitals of this country and Europe, including Cincinnati, New York, Paris, Edinburgh and Dublin.

The healing art was beginning at this time to take on its modern or scientific phase. It was fast putting off its empirical or experimental character and was steadily becoming more rational and more intelligible. Cause and effect were beginning to be recognized as co-extensive with its entire domain. In every case of disease the physician was taught to inquire for the cause so that he might know how to strike intelligently and effectively, in his treatment. While this training was indispensable to the young physician, it was of equal or even greater value to Dr. Townshend, the farmer. The transfer of this new knowledge from the study of man to the service of agriculture, was easy and natural. There were a thousand points of contact between the two. He came to see that every department of the world is under natural law and that a man's chief interest is in finding out the laws that touch his own life and work. Many of the processes of agriculture, the alternation and succession of crops, the maintenance of fertility in the soil, the rearing and care of the domestic animals, carried on previously, according

to "the traditions of the elders," became in the light of his new knowledge intelligible and transparent. I repeat, it was the study of medicine that made Dr. Townshend a farmer in the worthiest sense of the word. If he had remained a farmer of the pre-scientific or unscientific type, he would probably have proved a sagacious and successful one; but instead of leading forward his brethren to a solid and enduring basis for their work, he would very likely have expended a large amount of surplus energy in sharp denunciation of acknowledged evils, connected perhaps with railroads, manufacturers and trusts, and with just as little practical result as usually attends such denunciations.

We shall see a little later a striking result of the influence that his medical training had on his views of what the farmer most needs.

But, you will remember, the second mark of the educator is an interest in his fellow men. To know, or even to discover truth is not enough. The educator must be not only willing but eager to communicate his knowledge to others; to share its advantages with others.

No one who knew Dr. Townshend will question his ability to pass this test. There was born in him a large stock of altruism, that is, of care for others. This was made evident in his early manhood, by the great interest he took in the temperance reform and the anti-slavery movement of those days, and at a later time, by the interest he took in the defective classes and especially in the education of imbeciles. His whole life, early and late, is a witness to his zeal in the service of a rational and scientific agriculture. To overcome the indifference or distrust of the farmers of the state towards scientific agriculture, to prove to them that a knowledge of the laws under which all their work goes on is their first and chief interest, to show men how much more attractive the ancient art becomes when illuminated by science, to make them see that the only way to prevent their sons from leaving the farm lay in the transformation of farming from the endless drudgery of the peasant into the reasonable labors of the trained and educated man—

in all these fields of effort Dr. Townshend's labors were truly of the apostolic sort. Wherever farmers were gathered together, in neighboring clubs, in town, county, or state societies, conventions or institutes, his voice was heard. For two score years this was an important part of his life work. No man in the country, certainly no man in Ohio, was as active and persistent as he in keeping before the people the great fact that the only successful agriculture of the future must be scientific agriculture.

But the time came at last for a step in advance, and here the influence of his medical training comes clearly to view. The idea of an agricultural college, established on similar lines to those of a medical college, had gradually grown up in Dr. Townshend's mind. He urged this for years and finally enlisted three other gentlemen of kindred views and tastes to undertake with him the labor and responsibility of such an experiment. Two of them, like himself, were educated physicians—Dr. James Dascomb, Professor of Physiology and allied branches in Oberlin College, and Dr. John S. Newberry, a young physician of Cleveland, who like Dr. Townshend, had enjoyed professional study abroad and whose heart, like his, was devoted to the diffusion of knowledge and whom a great career in science awaited. The third of his allies was Professor James H. Fairchild, also a member of the Oberlin faculty, a large-hearted and public-spirited man, himself sprung from the soil and thoroughly familiar with the existing conditions of American agriculture and thoroughly alive as well to its imperious needs in the way of scientific improvement and progress. Prof. Fairchild, at a later date, became the President of Oberlin College, and after a long term of honorable service is now passing the evening hours of a well-spent and noble life in peace and quietness. He is the only one of the founders of the Agricultural College of Ohio who still lingers here.

The first meeting of the so-called Agricultural College was held at Oberlin on the last Monday of December, 1854. On that day, Dr. Townshend, accompanied by his newly wedded wife, drove

to Oberlin from his home in Avon, in the face of one of the severest snowstorms ever experienced in that section of the state. The name by which such storms are now known is familiar to us all. We should have called the storm a terrible blizzard. It was the week of the Christmas vacation in Oberlin College and but a few of the students were left in town. Of the young farmers of the region, for whom the college was established, but a handful appeared. The weather and the condition of the roads served to account for their absence in part. The program was, however, carried out, courses of lectures were given, and Ohio thus led the states of the Union in the establishment and operation of a college devoted to agriculture alone. The next state to follow this great example was Michigan. Her agricultural college was established three years later, viz., in 1857, but on a broad and permanent foundation. It has been like "a city set on a hill" ever since.

This Ohio agricultural college was transferred to Cleveland for the next two years in the hope that larger numbers could be gathered there, but the results were not encouraging, to say the least. The professors had all the work to do and besides this, were obliged to pay most of the expenses of the undertaking out of their own pockets.

This college of 1854 was the work of *Educators*, of men who had something to teach to the people and who proved their interest by giving their message at their own cost. Of this college, Dr. Townshend was the heart and soul. It embodied or foreshadowed, rather, his ideals for the farmers of the state. He could see no greater service to them than to gather their young men into the laboratories and lecture rooms of an institution equipped for this purpose and where the teachings of chemistry and physics, of biology, geology and meteorology in their applications to agriculture, would be adequately expounded. The model that he had distinctly before him in all this, was the medical college of fifty years ago. His aim was to provide a professional education for farmers.

I have already pointed out the chief characteristics of Dr. Townshend as an

educator as I see them. I have also noted some of the earlier occasions and opportunities in which these characteristics were displayed. It is not necessary at this time to pursue his history in detail further.

From 1850-1860 it was apparent that a change in the atmosphere was in progress, brought about in large part by the labors of Dr. Townshend and just such men as he. Thoughtful men in all out advanced communities were coming to recognize that the application of science to agriculture was a matter of national concern. Finally, in 1862, the Land Grant Act took its place among the statutes of the United States.

I am not familiar enough with the facts or the philosophy of history to make my judgment especially valuable, but I can safely say that I know of no similar legislation in the world that has borne such prompt and abundant fruitage or that holds such brilliant and beneficent promise for the future as the Morrill Act of July, 1862.

I can only name at this time, Dr. Townshend's professorship of one year in the Agricultural College of Iowa and his twenty-five years of service in this institution. As a college lecturer, he was always instructive and interesting. No man could be more faithful than he to all classroom duties, no man more devoted to every interest of his students, physical, intellectual, moral, than he. He always felt himself repaid for all his labor when even the humblest member of his classes gave evidence of interest in and profit from his lectures; but I consider this part of his service as decidedly inferior in power after all to the general influence that he exercised on the great agricultural interest of the state, the influence which has led in due time to the demand for a building that shall worthily house the teaching of scientific agriculture in this institution.

In obedience to this demand, to which the Board of Trustees has responded with most cordial interest and appreciation, the noble structure for the dedication of which we are now gathered, has risen, broad, solid, comely and honest to the laying of every brick, from roof tree to foundation stone, in full keeping with the great interest which it represents.

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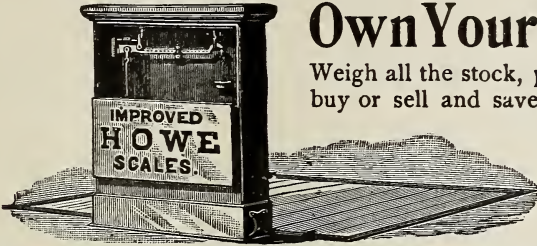
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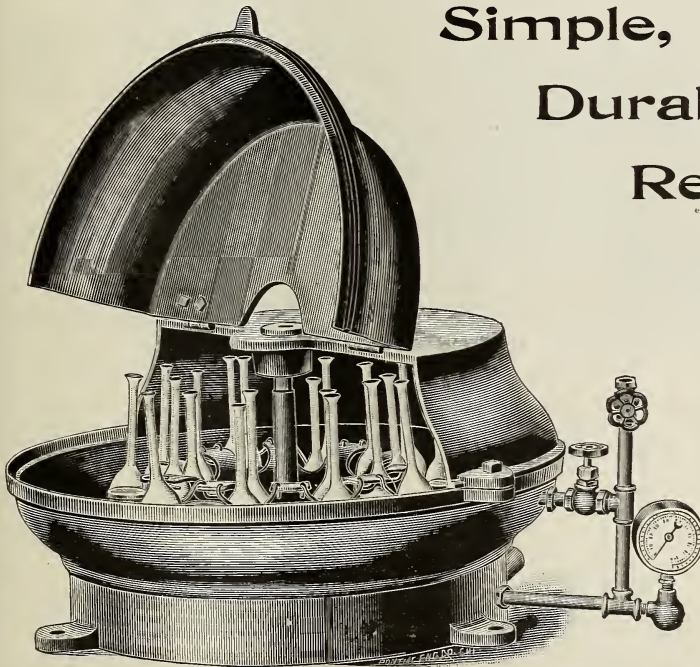
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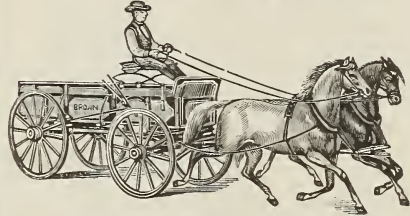
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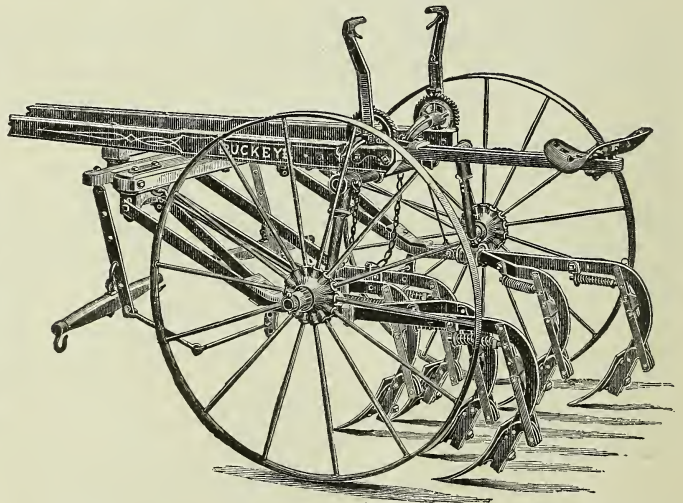
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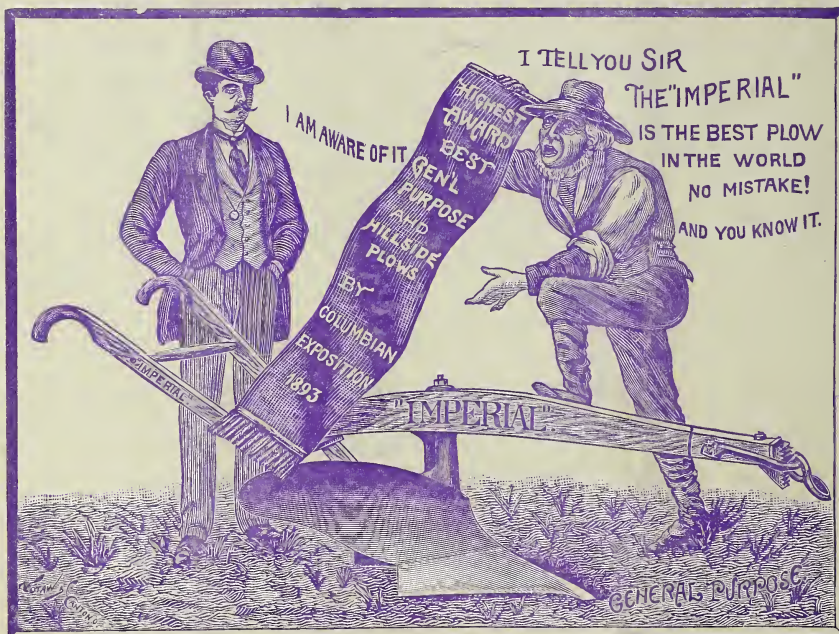
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